

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

REC'D 15 JUL 2005

PCT

PCT

To:

see form PCT/ISA/220

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/B2005/050956

International filing date (day/month/year)  
21.03.2005

Priority date (day/month/year)  
29.03.2004

International Patent Classification (IPC) or both national classification and IPC  
G10L15/22, G10L15/26

Applicant  
PHILIPS INTELLECTUAL PROPERTY & STANDARDS GMBH

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office - P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk - Pays Bas  
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl  
Fax: +31 70 340 - 3016

Authorized Officer

Santos Luque, R

Telephone No. +31 70 340-2594



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/IB2005/050956

---

**Box No. I Basis of the opinion**

---

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.  
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:  
☐ a sequence listing  
☐ table(s) related to the sequence listing
  - b. format of material:  
☐ in written format  
☐ in computer readable form
  - c. time of filing/furnishing:  
☐ contained in the international application as filed.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/IB2005/050956

---

**Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

---

**1. Statement**

Novelty (N)	Yes: Claims	6-8, 11-12
	No: Claims	1-5, 9-10, 13
Inventive step (IS)	Yes: Claims	6
	No: Claims	1-5, 7-13
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	-

**2. Citations and explanations**

**see separate sheet**

**Re Item V.**

**1** Reference is made to the following documents:

- D1: US-B1-6 513 009 (COMERFORD ET AL) 28 January 2003 (2003-01-28)  
D2: DATABASE INSPEC [Online] THE INSTITUTION OF ELECTRICAL ENGINEERS, STEVENAGE, GB; 15 December 1998 (1998-12-15), BREWSTER S: "The design of sonically-enhanced widgets" XP002334092 Database accession no. 6166302  
D3: US 2003/098892 A1 (HIIPAKKA) 29 May 2003 (2003-05-29)  
D4: SAWHNEY N ET AL: "NOMADIC RADIO: SCALEABLE AND CONTEXTUAL NOTIFICATION FOR WEARABLE AUDIO MESSAGING" CHI '99 CONFERENCE PROCEEDINGS HUMAN FACTORS IN COMPUTING SYSTEMS. PITTSBURGH, PA; NEW YORK, NY : ACM, US, 15 May 1999 (1999-05-15), - 20 May 1999 (1999-05-20) pages 96-103, XP000894208 ISBN: 0-201-48559-1  
D5: GAVER AND SMITH: "Auditory icons in large-scale collaborative environments" HUMAN-COMPUTER INTERACTION - INTERACT 90 D. DIAPER ET AL. (EDITORS) ELSEVIER SCIENCE PUBLISHERS B.V. (NORTH HOLLAND), 1990, XP008049217

**2** The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

2.1 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document):

A dialog management system which supports a dialog between one or more applications and an application user (see col. 2, lin. 21-25), wherein each application provides its specific prompt application data (see col. 7, lin. 13-17, 30- 39 and fig. 1B, ref. 1340), the output sounds being unique and distinctive for each application (see col. 6, lin. 23-24 and col. 8, lin. 14-16) and being played back by the dialog manager to inform the user of the status of an application (see col. 11, lin. 4-14).

The same objection accordingly applies to its corresponding system claim 10 and computer program product claim 13.

2.2 It is noted that the term "auditory icon" in claim 1 has been interpreted according to the description of the application on page 3, line 19-20, as "any type of sound used to describe a particular type of feedback from the application". Therefore, the prompt data referred to in document D1 falls within the scope of the term.

3 Having regard to §2.2, in case that the term "auditory icon" were meant to exclusively refer to an artificial short sound chunk (earcon) or a pre-recorded sound chunk, thereby excluding a speech prompt as given in D1 (see, i.a., fig. 7), the present application would not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 would not involve an inventive step in the sense of Article 33(3) PCT, the reasons being as follows:

Document D1 discloses the use of a playback engine which can be called on playback by an application (see D1, col. 14, lin. 5-19 and col. 16, lin. 50-61). Furthermore, the disclosure of D1 does not limit the sound output of the system to speech but also suggests the use of other output sounds such as "earcons" (see D1, col. 5, lin. 4-5). The skilled person would therefore be prompted to use earcons in the system described in document D1.

The use of earcons or auditory icons as audible feedback in dialog systems has been widely employed within the technical field, i.e. auditory interfaces (see, as an example, document D2). The skilled person would therefore regard it as a normal design option to include this feature in the dialog management method described in document D1, thereby arriving at a method according to claim 1. It is additionally noted, that document D2 also discloses the use of a distinctive set of earcons for a given application (see D2, pag. 216, last par. - pag. 217, par. 2).

The same objection accordingly applies to its corresponding system claim 10 and computer program product claim 13.

4 Dependent claims 2-5, 7-9, 11 and 12 do not contain any features which, in

combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step. The additional features disclosed in said dependent claims are either disclosed in cited documents or either represent normal design choices extensively used in auditory interfaces. See documents D1-D5 and the corresponding passages cited in the search report.

5 The combination of the features of dependent claim 6 is neither known from, nor rendered obvious by, the available prior art. The reasons are as follows:

In the method of document D1, the unique and distinctive auditory icons for each application are given by a profile. In said method, the common dialog management system does not modify and/or choose the given set of auditory icons of an application in order to make them unique. The combination of features of claim 6 is therefore new (Article 33(2) PCT).

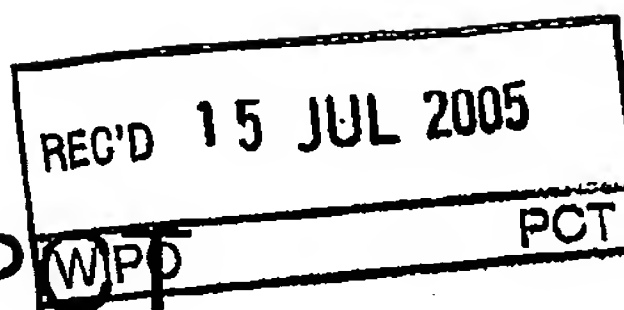
The problem to be solved is therefore regarded as how to avoid any confusion on the part of the user when two or more applications have similar or identical auditory icons in their repertory.

There is no suggestion or hint in D1 that would prompt the skilled person to modify the system of document D1 in order to perform a method as claimed in claim 6. In addition, although other prior art documents, such as document D2, also mention the importance of having distinctive sounds for each application (see D2, pag. 216, last par. - pag. 217, par. 2), the solution given by the application to the problem posed is not found in, nor suggested by, any of the available prior art documents. The solution proposed is therefore regarded as involving an inventive step (Article 33(3) PCT).



# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY



To:

see form PCT/ISA/220

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/B2005/050956

International filing date (day/month/year)  
21.03.2005

Priority date (day/month/year)  
29.03.2004

International Patent Classification (IPC) or both national classification and IPC  
G10L15/22, G10L15/26

Applicant  
PHILIPS INTELLECTUAL PROPERTY & STANDARDS GMBH

### 1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

### 3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office - P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk - Pays Bas  
Tél. +31 70 340 - 2040 Tx: 31 651 epo nl  
Fax: +31 70 340 - 3016

Authorized Officer

Santos Luque, R

Telephone No. +31 70 340-2594



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/IB2005/050956

---

**Box No. I Basis of the opinion**

---

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.  
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:  
☐ a sequence listing  
☐ table(s) related to the sequence listing
  - b. format of material:  
☐ in written format  
☐ in computer readable form
  - c. time of filing/furnishing:  
☐ contained in the international application as filed.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/IB2005/050956

---

**Box No. V Reasoned statement under Rule 43*b*/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

---

**1. Statement**

Novelty (N)	Yes: Claims	6-8, 11-12
	No: Claims	1-5, 9-10, 13
Inventive step (IS)	Yes: Claims	6
	No: Claims	1-5, 7-13
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	-

**2. Citations and explanations**

**see separate sheet**

**Re Item V.**

**1** Reference is made to the following documents:

- D1: US-B1-6 513 009 (COMERFORD ET AL) 28 January 2003 (2003-01-28)
- D2: DATABASE INSPEC [Online] THE INSTITUTION OF ELECTRICAL ENGINEERS, STEVENAGE, GB; 15 December 1998 (1998-12-15), BREWSTER S: "The design of sonically-enhanced widgets" XP002334092 Database accession no. 6166302
- D3: US 2003/098892 A1 (HIIPAKKA) 29 May 2003 (2003-05-29)
- D4: SAWHNEY N ET AL: "NOMADIC RADIO: SCALEABLE AND CONTEXTUAL NOTIFICATION FOR WEARABLE AUDIO MESSAGING" CHI '99 CONFERENCE PROCEEDINGS HUMAN FACTORS IN COMPUTING SYSTEMS. PITTSBURGH, PA; NEW YORK, NY : ACM, US, 15 May 1999 (1999-05-15), - 20 May 1999 (1999-05-20) pages 96-103, XP000894208 ISBN: 0-201-48559-1
- D5: GAVER AND SMITH: "Auditory icons in large-scale collaborative environments" HUMAN-COMPUTER INTERACTION - INTERACT 90 D. DIAPER ET AL. (EDITORS) ELSEVIER SCIENCE PUBLISHERS B.V. (NORTH HOLLAND), 1990, XP008049217

**2** The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

**2.1** The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document):

A dialog management system which supports a dialog between one or more applications and an application user (see col. 2, lin. 21-25), wherein each application provides its specific prompt application data (see col. 7, lin. 13-17, 30-39 and fig. 1B, ref. 1340), the output sounds being unique and distinctive for each application (see col. 6, lin. 23-24 and col. 8, lin. 14-16) and being played back by the dialog manager to inform the user of the status of an application (see col. 11, lin. 4-14).

The same objection accordingly applies to its corresponding system claim 10 and computer program product claim 13.

2.2 It is noted that the term "auditory icon" in claim 1 has been interpreted according to the description of the application on page 3, line 19-20, as "any type of sound used to describe a particular type of feedback from the application". Therefore, the prompt data referred to in document D1 falls within the scope of the term.

3 Having regard to §2.2, in case that the term "auditory icon" were meant to exclusively refer to an artificial short sound chunk (earcon) or a pre-recorded sound chunk, thereby excluding a speech prompt as given in D1 (see, i.a., fig. 7), the present application would not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 would not involve an inventive step in the sense of Article 33(3) PCT, the reasons being as follows:

Document D1 discloses the use of a playback engine which can be called on playback by an application (see D1, col. 14, lin. 5-19 and col. 16, lin. 50-61). Furthermore, the disclosure of D1 does not limit the sound output of the system to speech but also suggests the use of other output sounds such as "earcons" (see D1, col. 5, lin. 4-5). The skilled person would therefore be prompted to use earcons in the system described in document D1.

The use of earcons or auditory icons as audible feedback in dialog systems has been widely employed within the technical field, i.e. auditory interfaces (see, as an example, document D2). The skilled person would therefore regard it as a normal design option to include this feature in the dialog management method described in document D1, thereby arriving at a method according to claim 1. It is additionally noted, that document D2 also discloses the use of a distinctive set of earcons for a given application (see D2, pag. 216, last par. - pag. 217, par. 2).

The same objection accordingly applies to its corresponding system claim 10 and computer program product claim 13.

4 Dependent claims 2-5, 7-9, 11 and 12 do not contain any features which, in

combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step. The additional features disclosed in said dependent claims are either disclosed in cited documents or either represent normal design choices extensively used in auditory interfaces. See documents D1-D5 and the corresponding passages cited in the search report.

5 The combination of the features of dependent claim 6 is neither known from, nor rendered obvious by, the available prior art. The reasons are as follows:

In the method of document D1, the unique and distinctive auditory icons for each application are given by a profile. In said method, the common dialog management system does not modify and/or choose the given set of auditory icons of an application in order to make them unique. The combination of features of claim 6 is therefore new (Article 33(2) PCT).

The problem to be solved is therefore regarded as how to avoid any confusion on the part of the user when two or more applications have similar or identical auditory icons in their repertory.

There is no suggestion or hint in D1 that would prompt the skilled person to modify the system of document D1 in order to perform a method as claimed in claim 6. In addition, although other prior art documents, such as document D2, also mention the importance of having distinctive sounds for each application (see D2, pag. 216, last par. - pag. 217, par. 2), the solution given by the application to the problem posed is not found in, nor suggested by, any of the available prior art documents. The solution proposed is therefore regarded as involving an inventive step (Article 33(3) PCT).





Alternatively, the dialog management system might first request an application to supply only the relevant identifying information for each auditory icon in its set, such as a unique descriptive name or number, and any usage instructions associated with the  
5 different auditory icons. The dialog management system might then request each auditory icon only as the necessity arises, in order to reduce memory costs. The dialog management system might equally decide, on the basis of the preceding dialog flow, which type of auditory icon it might require for a particular application in the near future, and it might request this auditory icon in advance from the application.

10

For an application that does not avail of a pre-defined set of auditory icons, the dialog management system can provide an appropriate set. To this end, the dialog management system might be able to determine the nature of the application and decide on a suitable set of auditory icons, or the user might choose to define the auditory icons himself. He  
15 might do this by locating a sound chunk in digital form, for example by downloading from the internet or extracting a suitable sound chunk from a soundtrack or song, or he might record a sound chunk using a recording apparatus and communicate the recording to the dialog management system. For example, he might record or obtain a recording of a Formula One racing car being driven at speed, transfer the recording to  
20 the dialog management system where it is stored in a local memory by the auditory icon management unit, and specify that this sound chunk be played whenever an application for providing sports news reports an update about a Formula One race. The user might also advantageously use the microphone of the dialog management system to record a suitable sound chunk. In a preferred embodiment of the invention, the dialog  
25 management system is equipped with a suitable interface for connection to a portable memory such as a USB stick, memory card etc., or to any external network such as the internet, for the purpose of locating and downloading sound chunks for use as auditory icons.



- In a particularly preferred embodiment of the invention, the dialog management system is able to provide an application with any auditory icons which it might require. For example, it might be that an application only disposes of one or two auditory icons, for example to indicate the start of a process, or to indicate that an error has occurred, requiring the attention of the user. However, such a small selection might not be sufficient for an intuitive and easily understood dialog flow between the user and the application. In this case, the dialog management system might choose a set of suitable auditory icons from a selection available, and assign these to the application.
- 10 Furthermore, it might be that two or more applications have similar or identical auditory icons in their repertoire. To avoid any confusion on the part of the user that might arise should both applications be simultaneously active, these auditory icons might be modified by the dialog management system in some way, or might be replaced by different, equally suitable auditory icons. For example, on loading a new application, 15 the dialog management system examines the auditory icons associated with the new application, and compares them to the auditory icons already assigned to the other applications. If any of the new auditory icons is identical or very similar to any existing auditory icon, the dialog management system preferably informs the user, and suggests suitable alternatives if it has any available. If no suitable alternative auditory icons are 20 available, the dialog management system might prompt the user to enter suitable replacements.

Examples of auditory icons which an application might use to provide audible feedback to the user are start auditory icons, to be played when a dialog flow between the user and the application is activated or reactivated from stand-by, and end auditory icons, to 25 be played when the dialog flow between the user and the application is concluded, deactivated, or placed in a stand-by mode. The start auditory icon itself should reflect the nature of the application, while the end auditory icon might simply be the sounds of

- the start icon, played in reverse order. An application might also use informative auditory icons, whose sound contains some clue as to the nature of the application or the actual feedback type associated with this auditory icon. For example an application for supplying weather forecast updates might play an auditory icon with weather-associated sounds such as wind for stormy weather, raindrops for rainy weather and birdsong for fair weather. Other examples of auditory icons might be those used to provide status or information updates during the time that an application is active. For example, an application running a personal digital assistant might have several auditory icons for supplying the user with different types of status feedback concerning appointments, incoming emails, due-dates for reports, etc. For example, the personal digital assistant might repeatedly remind the user of an upcoming appointment using an appropriate audible icon, with the reminders becoming more and more persistent as the appointment draws near.
- 15 In a preferred embodiment of the invention, the user might specify which audible icons of which applications he would like to hear during a dialog flow, by entering suitable information into a user profile. He might also specify the loudness of the auditory icons, and the number of times an auditory icon is to be played during the dialog flow. In addition, he can assign priorities to the various applications, so that feedback from an intercom takes priority over an application such as a personal digital assistant. In this way, the user ensures that he will always be informed of the higher-priority application in the event that higher- and lower-priority applications simultaneously report feedback in the dialog flow. The user profile can be consulted regularly or after every modification by the auditory icon management unit to determine whether an auditory icon should be played back, the desired loudness, and the number of times this auditory icon can be played back during this dialog flow.
- 25

In a further preferred embodiment, the dialog management system can deduce user

preferences by interpreting dialog flow. For example, if an application has reported a reminder for an upcoming appointment by means of an appropriate auditory icon, and the user replies "I know, I know", the dialog management system can interpret this to mean that the user does not need reminding again, and might suppress the auditory icon for this feedback the next time it is initiated by the application. This level of "intelligent" interpretation on the part of the dialog management system might also be specified by the user in the user profile. For a dialog management system used by more than one user, a number of user profiles can preferably be configured, so that each user has his own private user profile in which he can specify his own personal preferences.

10

A dialog management system according to the present invention might perform some of the processing steps described above by implementing software modules or a computer program product. Such a computer program product might be directly loadable into the memory of a programmable dialog management system. Some of the units or modules such as the core dialog engine, application interface unit and auditory icon management unit can thereby be realised in the form of computer program modules. Since any required software or algorithms might be encoded on a processor of a hardware device, an existing electronic device might easily be adapted to benefit from the features of the invention. Alternatively, the units or blocks for processing user input and the output prompts in the manner described can equally be realised using hardware modules.

Other objects and features of the present invention will become apparent from the following detailed descriptions considered in conjunction with the accompanying drawing. It is to be understood, however, that the drawing is designed solely for the purposes of illustration and not as a definition of the limits of the invention, for which reference should be made to the appended claims.

25

The sole figure, Fig.1, is a schematic block diagram of a dialog management system in

Not all applications will have a complete set of suitable auditory icons at its disposal. Some applications may not have any auditory icons at all, and some applications might even have identical auditory icons. To deal with such situations, the auditory icon management unit 11 can assign auditory icons to an application  $A_2$  by choosing suitable ones from a collection of pre-defined auditory icons 13. For such an application, the user might prefer to have the auditory icon management unit 11 assign a particular sound recording to the application  $A_2$ . For example, the user might like to hear the sound of birdsong when the weather service  $A_2$  reports fair weather. If stormy weather is forecast, the user might like to hear the sound of thunder. The user can input these recordings as audio data in a suitable format via a user interface 15, and have the auditory icon management unit 11 assign them to the weather service application  $A_2$ . Another way of supplying the auditory icon management unit 11 with such recordings is to download them from an external computer or a network 12 such as the internet, via a suitable interface 14.

These different ways of obtaining auditory icon information allow the dialog management system 1 to collect all the information it requires in order to playback the relevant auditory icons as required in the dialog flow.

The dialog flow in this example consists of communication between the user, not shown in the diagram, and the various applications  $A_1, A_2, A_3, \dots, A_n$  driven by the dialog management system 1. The user issues spoken commands or requests to the dialog management system 1 through a microphone 5. The spoken commands or requests are recorded and digitised in an input detection arrangement 4, which passes the recorded speech input to a core dialog engine 8. This engine 8 comprises several blocks for performing the usual steps involved in speech recognition – an audio interface block 20 performs some necessary digital signal processing on the input

speech signal before forwarding it to an automatic speech recogniser 21. This extracts any recognisable speech components from the input audio signal and forwards these to a language understanding block 22. In the language understanding block 22, the spoken commands or requests of the user are analysed for relevance and passed on as  
5 appropriate to the dialog controller 23, which converts the user input into commands or requests that can be executed by the appropriate application  $A_1, A_2, A_3, \dots, A_n$ .

Should it be necessary to obtain some further information from the user, for example if the spoken commands can not be parsed or understood by the automatic speech  
10 recogniser 21 and language understanding 22 blocks, or if the spoken commands cannot be applied to any of the applications  $A_1, A_2, A_3, \dots, A_n$  that are active, the dialog controller 23 generates appropriate requests and forwards these to a speech generator 24 where they are synthesized to speech. The audio interface block 20 performs the necessary digital signal processing on the output speech signal which is then converted  
15 in an sound output arrangement 6 such as a loudspeaker to give audible sound 7.

In a typical example of a dialog flow controlled by the dialog management system of Fig. 1, the user might wish to enter an appointment into the diary of his personal digital assistant  $A_1$ . All he needs to do is to say "Enter appointment with tax advisor next  
20 Monday at 11am". The core dialog engine 8 converts the command into the appropriate form and submits it to the personal digital assistant application  $A_1$ . If the appointment can be entered without any problem into the personal digital assistant  $A_1$ , the appropriate feedback is reported to the dialog management system 1, which chooses the appropriate confirmatory feedback - such as a spoken "OK" or "Roger" - to be output.

25

If an appointment is already scheduled for the same time on that day, the personal digital assistant  $A_1$  reports back to the dialog management system 1, where the application interface 10 and/or the dialog controller 23 interprets the application's



response, and chooses the appropriate auditory icon – for example the sound of clashing cymbals to indicate to the user that the new appointment clashes with an appointment already entered. Additionally, the dialog controller 23 triggers generation of a suitable prompt, e.g. "You already have an appointment at 11am with Mr. So-and-so".

- 5    Optionally, the user may deactivate the prompt output if detailed feedback is not desired by the user .

In this example, the user has specified his preferences regarding the playback of auditory icons in a user profile, to customise or configure the extent to which he would like to be informed about events occurring in the applications he uses, and which applications are to be accorded a higher priority in the dialog flow. These preferences might endure until changed at some later time by the user, or they might be of a transitory nature. For example, the user might tell the dialog management system how to react within a certain period of time. For example, when the user says "Don't interrupt me for the next two hours unless it's really important", the dialog management system suppresses the reporting of minor events occurring during the following two hours, such as an automatic weather update, and postpones for two hours all relatively unimportant events such as 24-hour reminders for upcoming scheduled appointments "Dentist tomorrow afternoon at 3pm". The user would only be interrupted by a relatively important event such as a scheduled appointment during the specified time "Meeting with director in 15 minutes" or a telephone call from an client tagged in the telephone application A<sub>3</sub> as being important. The dialog management system decides what is important and what is relatively unimportant by examining the information specified in the user profile 3.

25

Other preferences might specify the priority given to the applications if two or more applications indicate that auditory icons are to be played at the same time. In this case, the user has specified in the user profile 13 that the telephone A<sub>3</sub> is to be assigned a

higher priority than the news and weather service A<sub>2</sub>. If the news and weather service A<sub>2</sub> is about to give its automatic news update, and an incoming call arrives at the same time, the application interface 10 acknowledges that the telephone application A<sub>3</sub> has the higher priority, and suppresses the auditory icon of the news and weather service  
5 A<sub>2</sub>, which may be postponed for output at a later point in time.

Although the present invention has been disclosed in the form of preferred embodiments and variations thereon, it will be understood that numerous additional modifications and variations could be made thereto without departing from the scope of  
10 the invention, for example the auditory icon management unit might be realised as part of the core dialog engine, or be incorporated in another module such as the dialog controller. In one embodiment of the invention, the dialog system might be able to determine the quality of the current user's voice after processing a few utterances, or the user might make himself known to the system by entering an identification code which  
15 might then be used to access stored user profile information which in turn would be used to generate appropriate control parameters for the audio interface.

For the sake of clarity, throughout this application, it is to be understood that the use of "a" or "an" does not exclude a plurality, and "comprising" does not exclude other steps  
20 or elements. The use of "unit" or "module" does not limit realisation to a single unit or module.



## CLAIMS

1. A method for driving multiple applications ( $A_1, A_2, A_3, \dots, A_n$ ) by a common dialog management system (1) where a unique set of auditory icons ( $S_1, S_2, S_3, \dots, S_n$ ) is  
5 assigned to each application ( $A_1, A_2, A_3, \dots, A_n$ ), and where the common dialog management system (1) informs a user () of the status of an application ( $A_1, A_2, A_3, \dots, A_n$ ) by playback, at a specific point in a dialog flow, of a relevant auditory icon ( $I_1, I_2, I_3, \dots, I_n$ ) selected from the unique set of auditory icons ( $S_1, S_2, S_3, \dots, S_n$ ) of the respective application ( $A_1, A_2, A_3, \dots, A_n$ ).  
10
2. A method according to claim 1, where the auditory icons ( $I_1, I_2, I_3, \dots, I_n$ ) of an application ( $A_1, A_2, A_3, \dots, A_n$ ) are played back to indicate to the user a change in operational status of an application ( $A_1, A_2, A_3, \dots, A_n$ ).
- 15 3. A method according to claim 1 or claim 2, where an application ( $A_1, A_2, A_3, \dots, A_n$ ) submits a set of auditory icons ( $S_1, S_2, S_3, \dots, S_n$ ) and associated instructions concerning the use thereof to the dialog management system (1).
- 20 4. A method according to claim 3, where identifying information for the individual auditory icons ( $I_1, I_2, I_3, \dots, I_n$ ) of an application ( $A_1, A_2, A_3, \dots, A_n$ ) and associated instructions are obtained by the dialog management system (1), and the auditory icons ( $I_1, I_2, I_3, \dots, I_n$ ) are retrieved by the dialog management system (1), from the application ( $A_1, A_2, A_3, \dots, A_n$ ) upon request.
- 25 5. A method according to claim 3, where the complete set of auditory icons ( $S_1, S_2, S_3, \dots, S_n$ ) of an application ( $A_1, A_2, A_3, \dots, A_n$ ) is acquired by the dialog management system (1) at the outset of a dialog flow between the user and the application ( $A_1, A_2, A_3, \dots, A_n$ ) or upon activation or installation of the application ( $A_1, A_2, A_3, \dots, A_n$ ).

6. A method according to any of the preceding claims, where the dialog management system (1) supplies an application ( $A_1, A_2, A_3, \dots, A_n$ ) with a unique set of auditory icons ( $S_1, S_2, S_3, \dots, S_n$ ), by modifying non-unique auditory icons ( $I_1, I_2, I_3, \dots, I_n$ ) in a set of auditory icons ( $S_1, S_2, S_3, \dots, S_n$ ) of the application ( $A_1, A_2, A_3, \dots, A_n$ ) and/or  
5 choosing unique auditory icons ( $I_1, I_2, I_3, \dots, I_n$ ) for the application ( $A_1, A_2, A_3, \dots, A_n$ ) from a collection (13) of auditory icons.

7. A method according to any of the preceding claims, where the set of auditory icons ( $S_1, S_2, S_3, \dots, S_n$ ) for playback in a dialog flow between a user and an application ( $A_1,$   
10  $A_2, A_3, \dots, A_n$ ) comprises at least one unique start auditory icon, for playback at commencement of the dialog flow and/or at least one unique end auditory icon, for playback at conclusion of a dialog flow.

8. A method according to any of the preceding claims, where the set of auditory icons  
15 ( $S_1, S_2, S_3, \dots, S_n$ ) for playback in a dialog flow between a user and an application ( $A_1, A_2, A_3, \dots, A_n$ ) comprises a number of unique informative auditory icons ( $I_1, I_2, I_3, \dots, I_n$ ), for playback at specific points during the dialog flow where each auditory icon ( $I_1, I_2, I_3, \dots, I_n$ ) describes a particular type of feedback from the application ( $A_1, A_2, A_3, \dots, A_n$ ).

20

9. A method according to any of the preceding claims, where auditory icons ( $I_1, I_2, I_3, \dots, I_n$ ) and/or playback characteristics of the auditory icons ( $I_1, I_2, I_3, \dots, I_n$ ) are specified for a user in a user profile (3).

10. A dialog management system (1) for driving a number of applications ( $A_1, A_2, A_3, \dots, A_n$ ), comprising

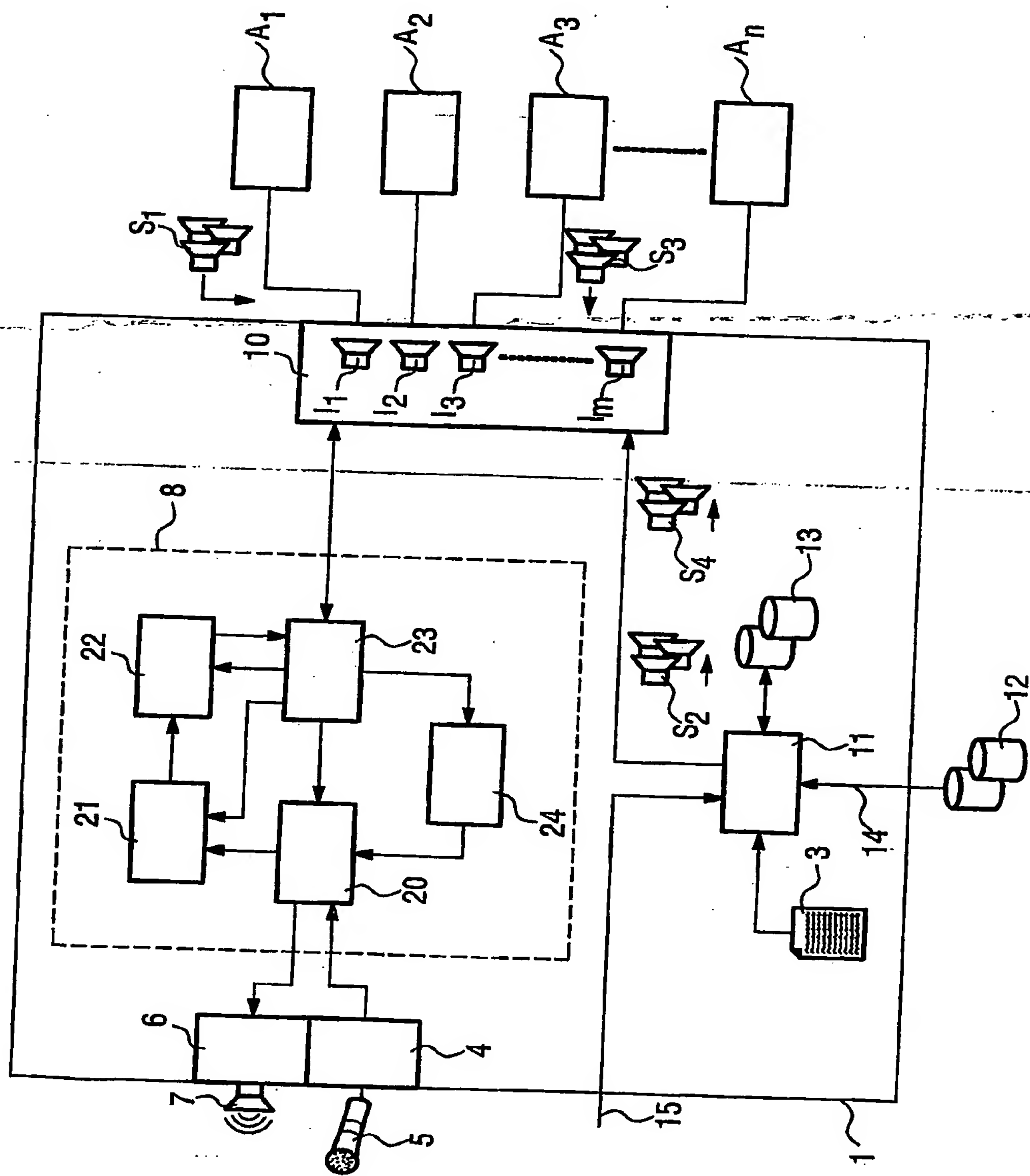
- an input detection arrangement (4) for detecting user input (5) to the system;
- a sound output arrangement (6) for outputting audible prompt (7);
- 5     - a core dialog engine (8) for coordinating a dialog flow by interpreting user input (5) and generating output prompts ();
- an application interface (10) for communication between the dialog management system (1) and the applications ( $A_1, A_2, A_3, \dots, A_n$ );
- 10     - a source of unique sets of auditory icons ( $S_1, S_2, S_3, \dots, S_n$ ) assigned to the applications ( $A_1, A_2, A_3, \dots, A_n$ );
- and an auditory icon management unit (11) for selecting relevant auditory icons ( $I_1, I_2, I_3, \dots, I_n$ ) from the unique sets of auditory icons ( $S_1, S_2, S_3, \dots, S_n$ ) corresponding to the applications ( $A_1, A_2, A_3, \dots, A_n$ ) for playback at specific points in the dialog flow.

15

11. A dialog management system (1) according to claim 11, comprising a means (15) for allowing the user to input auditory icons ( $I_1, I_2, I_3, \dots, I_n$ ).

12. A dialog management system (1) according to claim 11 or claim 12, comprising an  
20 interface (14) for obtaining sets of auditory icons ( $S_1, S_2, S_3, \dots, S_n$ ) or individual auditory icons ( $I_1, I_2, I_3, \dots, I_n$ ) from an external source (12)

13. A computer program product directly loadable into the memory of a programmable dialog management system (1) comprising software code portions for performing the  
25 steps of a method according to claims 1 to 10 when said product is run on the dialog management system (1).



**FIG. 1**